# Exercise - I (Conceptual Questions) Build Up Your Understanding

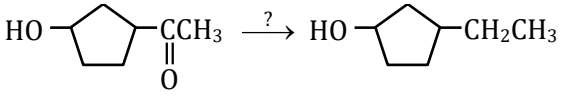
## Alkanes

**1.** The order of reactivity of alkyl halides in Wurtz reaction is
(1) R–I > R–Br > R–Cl (2) R–I < R–Br < R–Cl
(3) R–Br > R–I < R–Cl (4) R–I > R–Cl > R–Br

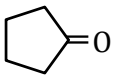
**2.** The Corey-House alkane synthesis is carried out by treating an alkyl halide with
(1) Lithium metal
(2) Copper metal
(3) Lithium metal followed by reaction with cuprous iodide and then treating the product with an alkyl halide
(4) Cuprous iodide followed by reaction with alkyl halide

**3.** Which of the following compound is not suitable to obtain from wurtz reaction ?
(1) Ethane (2) Butane
(3) Neopentane (4) Hexane

**4.** Which of the following reagent can be used for following conversion



(1) Zn – Hg/HCl (2) Red P + HI
(3) $NH_2 - NH_2/\Theta OH$ (4) All of them

**5.**  can be converted to by :
(1) Red P + HI
(2) Wolf Kishner reduction
(3) Clemmensen reaction
(4) All

**6.** $(CH_3)_3C-Br \xrightarrow[(ii)\ CuI]{(i)\ Li} A \xrightarrow[CH_3CH_2CH_2Br]{} B$ ; 'B' is
(1) $CH_3(CH_2)_2C(CH_3)_3$
(2) $(CH_3)_3C-C(CH_3)_3$
(3) $CH_3(CH_2)_4CH_3$
(4) $(CH_3)_2CH_2C(CH_3)_3$

**7.** Which of the following reactions does not involve a C—C bond formation
(1) Hydrolysis of a Grignard reagent
(2) Combination of two alkyl free radicals
(3) Corey-House synthesis of alkanes
(4) $RNa + R-Br \longrightarrow R-R + NaBr$

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**8.** Pyrolysis of alkanes is a
(1) Nucleophilic addition reaction
(2) Free radical substitution reaction
(3) Electrophilic addition reaction
(4) Free radical elimination reaction

**9.** Which of the following reactions of methane is incomplete combustion :-
(1) $2CH_4 + O_2 \xrightarrow{Cu/523K/100atm.} 2CH_3OH$
(2) $CH_4 + O_2 \xrightarrow{Mo_2O_3} HCHO + H_2O$
(3) $CH_4 + O_2 \longrightarrow C(s) + 2H_2O(\ell)$
(4) $CH_4 + 2O_2 \longrightarrow CO_2(g) + 2H_2O(\ell)$

## Alkene

**10.** Ozonolysis of 3–Methyl–1–butene gives a mixture of
(1) Propanal and ethanal
(2) Propanone and ethanal
(3) 2–Methylpropanal and methanal
(4) Butanone and methanal

**11.** Which alkene gives acetone only on ozonolysis
(1) Isobutylene
(2) 2,3–Dimethyl–1–butene
(3) 2,3–Dimethyl–2–butene
(4) 3,3–Dimethyl–1–butene

**12.** Oxidation of isobutylene with acid potassium permanganate gives
(1) Acetone + $CO_2$
(2) Acetic acid
(3) Acetic acid + $CO_2$
(4) Acetic acid + acetone

**13.** Which of the following reactions is used for locating the position of double bond in an alkene
(1) Hydroboration
(2) Hydroxylation
(3) Chlorohydroxylation
(4) Ozonolysis

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**14.** $CH_3CH_2CH_2Br \xrightarrow[\Delta]{\text{alc. KOH}} A \xrightarrow[\text{(ii) Zn, } H_2O]{\text{(i) } O_3} B + C$

In the above reaction A, B and C are given by the set

(1) Propylene, acetone, formaldehyde

(2) Propene, ethanal, methanal

(3) Propyne, acetaldehyde, formaldehyde

(4) Propylene, propionaldehyde, formaldehyde

**15.** Which one of the following has the smallest heat of hydrogenation per mole

(1) 1–butene (2) Trans–2–butene

(3) Cis–2–butene (4) Propene

**16.** An alkene "A" contains three C–C, eigth C–H σ-bonds and one C–C π-bond. "A' on ozonolysis gives two moles of an aldehyde of molar mass 44. Which of the following is the IUPAC name of A.

(1) But-1-ene (2) But-2-ene

(3) Pent-2-ene (4) But-2-yne

**17.** The molecules having dipole moment are :-

(1) 2,2-dimethylpropane

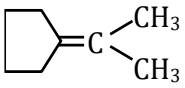
(2) trans pent-2-ene

(3) cis-hex-3-ene

(4) 2 and 3

**18.** Which of the following alkenes on ozonolysis give a mixture of ketones only?

(a) $CH_3–CH=CH–CH_3$ (b) $CH_3–\underset{\displaystyle CH_3}{\underset{|}{C}}H–CH=CH_2$

(c)  (d) $(CH_3)_2C=C<^{CH_3}_{CH_3}$

(1) a and b (2) b and c

(3) b and d (4) c and d

## Alkynes

**19.** Kolbe's electrolysis of sodium maleate at anode gives.

(1) Only acetylene (2) Only $CO_2$

(3) Acetylene + $CO_2$ (4) $CO_2 + H_2$

**20.** The pH of solution in Kolbe's electrolysis

(1) Increase with time

(2) Decrease with time

(3) Remains constant

(4) Nothing can be said

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**21.** Which of the following compound will not give a precipitate with Tollen's reagent

(1) Ethyne

(2) 1-butyne

(3) 3-methyl -1-butyne

(4) 1-pentene

**22.** $B \xleftarrow[H_2O_2/^-OH]{BH_3/THF} CH_3–C\equiv CH \xrightarrow{HgSO_4/H_2SO_4} A,$

A and B are

(1) $CH_3CH_2CHO, CH_3COCH_3$

(2) $CH_3COCH_3, CH_3CH_2CHO$

(3) $CH_3COCH_3$ both

(4) $CH_3COCH_3, CH_3CH_2CH_2OH$

**23.** $MeCH_2C\equiv CH \xrightarrow{NH_3/NaNH_2} A \xrightarrow{Et\ Br} B,$

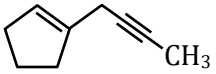
A and B are

(1) $MeCH_2C\equiv CNa$, $MeCH_2C\equiv C—Et$

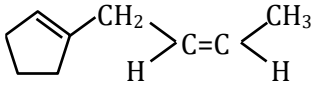
(2) $MeCH_2CH=CH_2$, $MeCH_2—CHEt—CH_3$

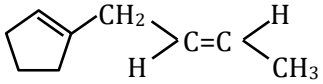
(3) $MeCH_2CH=CHNH_2$,$MeCH_2CH=CH–NHBr$

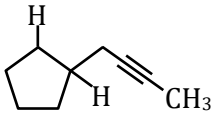
(4) $MeCH_2C\equiv C—NH_2$, $MeC\equiv C—NH—Br$

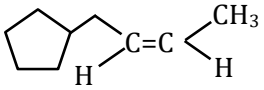
**24.**  $\xrightarrow[\text{Lindlar catalyst}]{H_2}$ product

will be :

(1) 

(2) 

(3) 

(4) 

**25.** To distinguish between propene and propyne, the reagent would be -

(1) Bromine

(2) Alkaline $KMnO_4$

(3) Ammonical silver nitrate

(4) Ozone

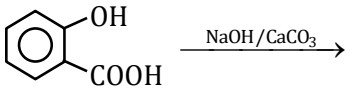
**26.** When treated with ammonical cuprous chloride, which one among the following forms red precipitate ?

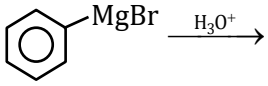
(1) $C_2H_6$ (2) $C_2H_4$

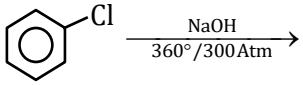
(3) $C_2H_2$ (4) $C_6H_6$

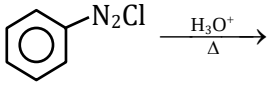
## Aromatic Hydrocarbons

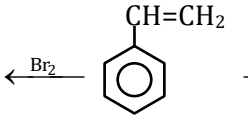
**27.** In which of the following reactions benzene is obtained

(1) 

(2) 

(3) 

(4) 

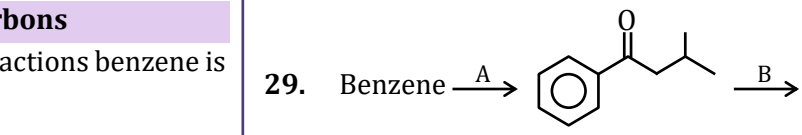
**28.** A  B ; A and B respectively are

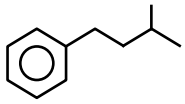
(1) o-bromo styrene, benzoic acid

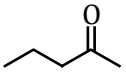
(2) p-bromostryrene, benzaldehyde

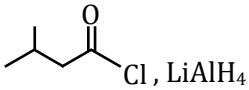
(3) m-bromostyrene, benzaldehyde

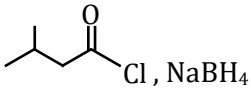
(4) Styrene dibromide, benzoic acid.

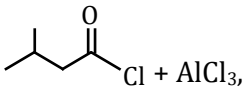
**29.** Benzene 

 ; A and B resectively are

(1) Zn – Hg + HCl , 

(2)  , $LiAlH_4$

(3)  , $NaBH_4$

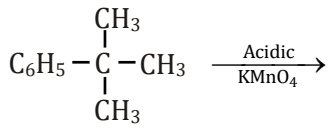
(4)  + $AlCl_3$, Zn—Hg + HCl

**30.** Which of the following reaction does not gives benzoic acid

(1) $C_6H_5—CH_3 \xrightarrow[KMnO_4]{\text{Acidic}}$

(2) $C_6H_5—CH_3 \xrightarrow[H_2O]{CrO_2Cl_2} \xrightarrow{[O]}$

(3) $C_6H_5\,C{\equiv}CH \xrightarrow[KMnO_4]{\text{Acidic}}$

(4) 

## EXERCISE-I (Conceptual Questions) ANSWER KEY

| Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Answer | 1 | 3 | 3 | 3 | 4 | 1 | 1 | 4 | 3 | 3 | 3 | 1 | 4 | 2 | 2 |
| Question | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| Answer | 2 | 4 | 4 | 3 | 1 | 4 | 2 | 1 | 1 | 3 | 3 | 2 | 4 | 4 | 4 |

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## Exercise - II (Previous Year Questions) AIPMT/NEET

### AIPMT 2007

**1.** Reduction of aldehydes and ketones into hydrocarbons using zinc amalgam and conc. HCl is called
(1) Cope reduction
(2) Dow reduction
(3) Wolf-kishner reduction
(4) Clemmensen reduction

**2.** Which of the compounds with molecular formula $C_5H_{10}$ yields acetone on ozonolysis
(1) 3-Methyl-1-butene
(2) Cyclopentene
(3) 2-Methyl-1-butene
(4) 2-Methyl-2-butene

**3.** Predict the product 'C' obtained in the following reaction of 1-butyne :

$$CH_3-CH_2-C\equiv CH \xrightarrow{HCl} B \xrightarrow{HI} C$$

(1) $CH_3-CH_2-CH_2-\underset{Cl}{\overset{I}{C}}-H$

(2) $CH_3-CH_2-\underset{}{\overset{I}{C}}H-CH_2Cl$

(3) $CH_3-CH_2-\underset{Cl}{\overset{I}{C}}-CH_3$

(4) $CH_3-\underset{Cl}{CH}-CH_2-CH_2I$

**4.** The order of decreasing reactivity towards electrophilic reagent for the following :
(a) Benzene (b) Toluene
(c) Chloro benzene (d) Phenol
(1) b > d > a > c
(2) d > c > b > a
(3) d > b > a > c
(4) a > b > c > d

### AIPMT 2008

**5.** $H_3C-\underset{}{\overset{CH_3}{CH}}-CH=CH_2 + HBr \longrightarrow A$

A (Predominantly) is :

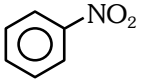
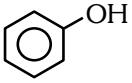
(1) $CH_3-\underset{Br}{\overset{CH_3}{C}}-CH_2CH_3$

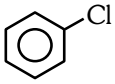
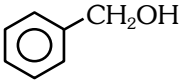
(2) $CH_3-\underset{Br}{CH}-\underset{CH_3}{CH}-CH_3$

(3) $CH_3-\underset{CH_3}{CH}-\underset{Br}{CH}-CH_3$

(4) $CH_3-\underset{CH_3}{CH}-CH_2-CH_2Br$

**6.** Which one of the following is most reactive towards electrophilic attack ?

(1)  (2) 

(3)  (4) 

### AIPMT 2009

**7.** Benzene reacts with $CH_3Cl$ in the presence of anhydrous $AlCl_3$ to form :-
(1) Xylene (2) Toluene
(3) Chlorobenzene (4) Benzylchloride

**8.** Nitrobenzene can be prepared from benzene by using a mixture of conc. $HNO_3$ and conc. $H_2SO_4$. In the mixture, nitric acid acts as a/an:-
(1) Catalyst (2) Reducing agent
(3) Acid (4) Base

### AIPMT 2010

**9.** Liquid hydrocarbons can be converted to a mixture of gasesous hydrocarbons by :-
(1) Hydrolysis
(2) Oxidation
(3) Cracking
(4) Distillation under reduced pressure

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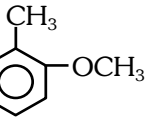
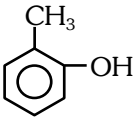
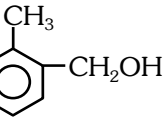
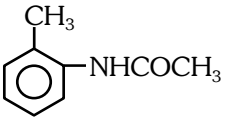
**10.** Which one is most reactive towards electrophilic reagent ?

(1) 
(2) 
(3) 
(4) 

**11.** The reaction of toluene with $Cl_2$ in presence of $FeCl_3$ gives 'X' and reaction in presence of light gives 'Y'. Thus, 'X' and 'Y' are :-

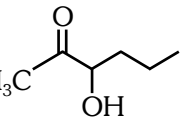
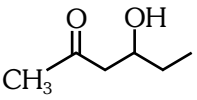
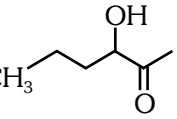
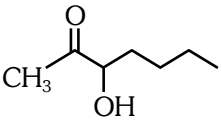
(1) X = Benzyl chloride,
Y = m–chlorotoluene

(2) X = Benzal chloride,
Y = o–chlorotoluene

(3) X = m–chlorotoluene,
Y = p–chlorotoluene

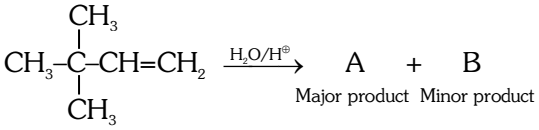
(4) X = o– and p–chlorotoluene
Y = Trichloromethyl benzene

**12.** Which one of the following compounds will be most readily dehydrated :-

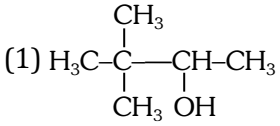
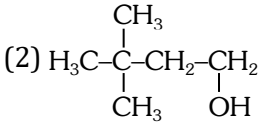
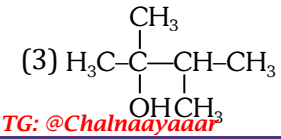
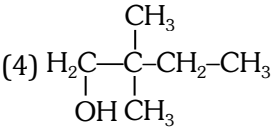
(1) 
(2) 
(3) 
(4) 

## AIPMT Pre.-2012

**13.** In the following reaction:




The major product is :-

(1) 
(2) 
(3) 
(4) 

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**14.** Among the following compounds the one that is most reactive towards electrophilic nitration is:

(1) Toluene (2) Benzene
(3) Benzoic Acid (4) Nitrobenzene

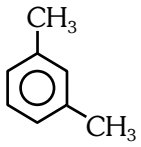
## NEET-UG 2013

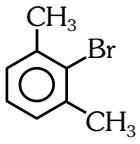
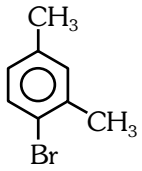
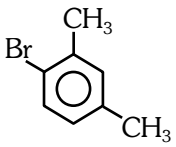
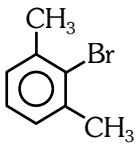
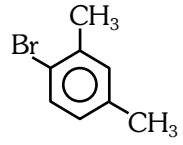
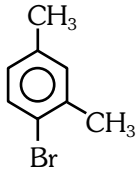
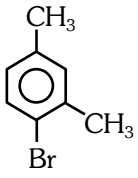
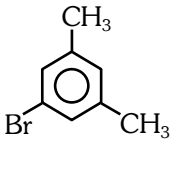
**15.** Which of the following compounds will not undergo Friedal-Craft's reaction easily :-

(1) Toluene (2) Cumene
(3) Xylene (4) Nitrobenzene

## AIPMT 2014

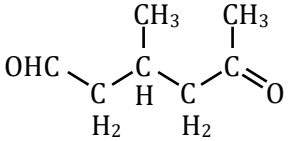
**16.** What products are formed when the following compound is treated with $Br_2$ in the presence of $FeBr_3$ ?



(1)  and 
(2)  and 
(3)  and 
(4)  and 

## AIPMT 2015

**17.** A single compound of the structure :-



is obtainable from ozonolysis of which of the following cyclic compounds ?

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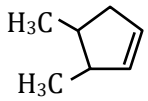
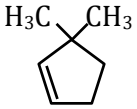
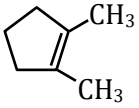
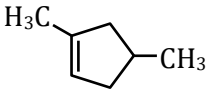
(1) 

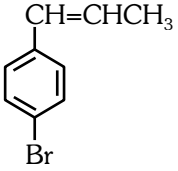
(2) 

(3) 

(4) 

**18.** The reaction of $C_6H_5CH = CHCH_3$ with HBr produces:-

(1) $C_6H_5CH_2\underset{\underset{Br}{|}}{C}HCH_3$ (2) $C_6H_5CH_2CH_2CH_2Br$

(3)  (4) $C_6H_5\underset{\underset{Br}{|}}{C}HCH_2CH_3$

## Re-AIPMT 2015

**19.** 2,3–Dimethyl–2–butene can be prepared by heating which of the following compounds with a strong acid ?

(1) $(CH_3)_2C=CH-CH_2-CH_3$

(2) $(CH_3)_2CH-CH_2-CH=CH_2$

(3) $(CH_3)_2CH-\underset{\underset{CH_3}{|}}{C}H-CH=CH_2$

(4) $(CH_3)_3C-CH=CH_2$

**20.** The oxidation of benzene by $V_2O_5$ in the presence of air produces :

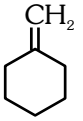
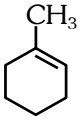
(1) Benzoic acid

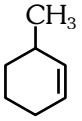
(2) Benzaldehyde

(3) Benzoic anhydride

(4) Maleic anhydride

**21.** In the reaction with HCl, an alkene reacts in accordance with the Markovnikov's rule, to give a product 1-chloro-1 methylcyclohexane. The possible alkene is :-

(1)  (2) 

(3) (1) and (2) (4) 

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## NEET-I 2016

**22.** In the reaction

$$H-C\equiv CH \xrightarrow[(2)\,CH_3CH_2Br]{(1)\,NaNH_2\,/\,liq.NH_3} X \xrightarrow[(2)\,CH_3CH_2Br]{(1)\,NaNH_2\,/\,liq.NH_3} Y$$

X and Y are :

(1) X = 1-Butyne ; Y = 3-Hexyne

(2) X = 2-Butyne ; Y = 3-Hexyne

(3) X = 2-Butyne ; Y = 2-Hexyne

(4) X = 1-Butyne ; Y = 2-Hexyne

**23.** Consider the nitration of benzene using mixed conc. $H_2SO_4$ and $HNO_3$. If a large amount of $KHSO_4$ is added to the mixture, the rate of nitration will be:-

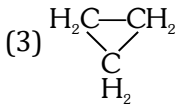
(1) Faster (2) Slower

(3) Unchanged (4) Doubled

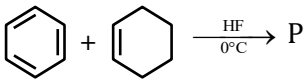
## NEET-II 2016

**24.** Which of the following compounds shall not produced propene by reaction with HBr followed by elimination or direct only by elimination reaction ?

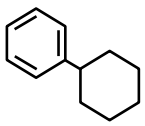
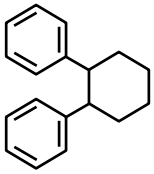
(1) $H_2C=C=O$ (2) $H_3C-\overset{\overset{H_2}{|}}{C}-CH_2Br$

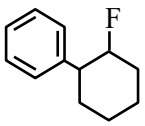
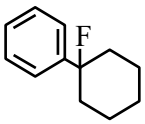
(3)  (4) $H_3C-\overset{\overset{H_2}{|}}{C}-CH_2OH$

**25.** In the given reaction



the product P is :-

(1)  (2) 

(3)  (4) 

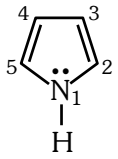
**26.** The compound that will react most readily with gaseous bromine has the formula

(1) $C_4H_{10}$ (2) $C_2H_4$

(3) $C_3H_6$ (4) $C_2H_2$

**27.** Which of the following can be used as the halide component for Friedel-Crafts reaction ?
(1) Chloroethene (2) Isopropyl chloride
(3) Chlorobenzene (4) Bromobenzene

**28.** In pyrrole



The electron density is maximum on :-
(1) 2 and 4 (2) 2 and 5
(3) 2 and 3 (4) 3 and 4

## NEET(UG) 2017

**29.** Predict the correct intermediate and product in the following reaction :

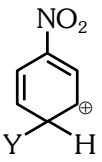
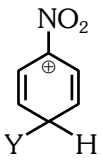
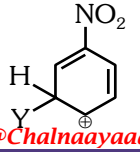
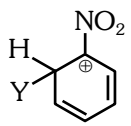
$H_3C-C\equiv CH \xrightarrow[HgSO_4]{H_2O,\ H_2SO_4}$ Intermediate (A) $\longrightarrow$ product (B)

(1) A : $H_3C-\underset{\underset{OH}{|}}{C}=CH_2$ B : $H_3C-\underset{\underset{SO_4}{|}}{C}=CH_2$
(2) A : $H_3C-\underset{\underset{O}{||}}{C}-CH_3$ B : $H_3C-C\equiv CH$
(3) A : $H_3C-\underset{\underset{OH}{|}}{C}=CH_2$ B : $H_3C-\underset{\underset{O}{||}}{C}-CH_3$
(4) A : $H_3C-\underset{\underset{SO_4}{|}}{C}=CH_2$ B : $H_3C-\underset{\underset{O}{||}}{C}-CH_3$

## NEET(UG) 2018

**30.** Hydrocarbon (A) reacts with bromine by substitution to form an alkyl bromide which by Wurtz reaction is converted to gaseous hydrocarbon containing less than four carbon atoms. (A) is
(1) $CH\equiv CH$ (2) $CH_2=CH_2$
(3) $CH_3-CH_3$ (4) $CH_4$

**31.** Which of the following carbocations is expected to be most stable ?

(1) 
(2) 
(3) 
(4) 

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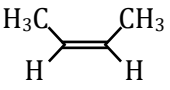
## NEET(UG) 2019

**32.** The most suitable reagent for the following conversion is :-

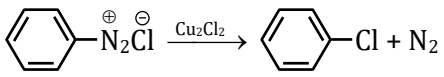
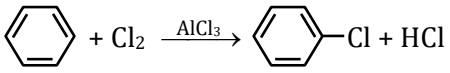
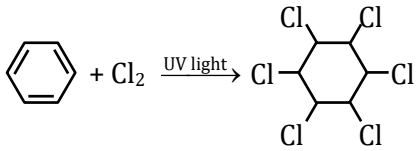
$H_3C-C\equiv C-CH_3 \longrightarrow$ 
cis-2-butene

(1) Na/liquid $NH_3$ (2) $H_2$, Pd/C, quinoline
(3) Zn/HCl (4) $Hg^{2+}/H^+$, $H_2O$

**33.** An alkene "A" on reaction with $O_3$ and $Zn-H_2O$ gives propanone and ethanal in equimolar ratio. Addition of HCl to alkene "A" gives "B" as the major product. The structure of product "B" is :-

(1) $Cl-CH_2-CH_2-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{CH}}$ (2) $H_3C-CH_2-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_2Cl}{|}}{CH}}$
(3) $H_3C-CH_2-\underset{\underset{Cl}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3$ (4) $H_3C-\underset{\underset{Cl}{|}}{\overset{\overset{CH_3}{|}}{CH}}-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{CH}}$

**34.** Among the following, the reaction that proceeds through an electrophilic substitution is :

(1) 
(2) 
(3) 
(4)

## NEET(UG) 2019 (ODISHA)

**35.** The alkane that gives only one mono-chloro product on chlorination with $Cl_2$ in presence of diffused sunlight is :-
(1) 2,2-dimethylbutane
(2) Neopentane
(3) n-pentane
(4) Isopentane

TG: @Chalnaayaaar

**36.** In the following reaction,

$$H_3C-C\equiv CH \xrightarrow[873\,K]{\text{red hot iron tube}} A,$$

the number of sigma(σ) bonds present in the product A is :-

(1) 21 (2) 9

(3) 24 (4) 18

## NEET(UG) 2020

**37.** Which of the following alkane cannot be made in good yield by Wurtz reaction ?

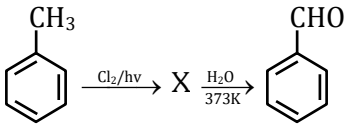
(1) n-Butane

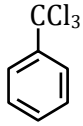
(2) n-Hexane

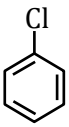
(3) 2,3-Dimethylbutane

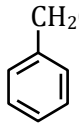
(4) n-Heptane

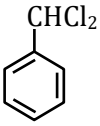
**38.** Identify compound X in the following sequence of reactions :



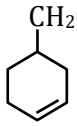

(1) 

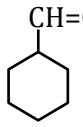

(2) 

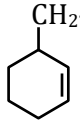

(3) 

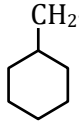

(4) 


**39.** An alkene on ozonolysis gives methanal as one of the product. Its structure is :

(1) 


(2) 


(3) 


(4) 


## NEET(UG) 2020 (COVID-19)

**40.** $CH_3CH_2CH = CH_2 \xrightarrow[H_2O_2,OH^-]{B_2H_6} Z$

What is Z ?

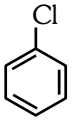
(1) $CH_3CH_2CH_2CH_2OH$

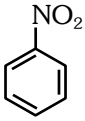
(2) $CH_3CH_2\underset{\underset{OH}{|}}{C}HCH_3$

(3) $CH_3CH_2CH_2CHO$

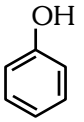
(4) $CH_3CH_2CH_2CH_3$

**41.** Which of the following compound is most reactive in electrophilic aromatic substitution?

(1) 


(2) 


(3)

(4) 


**42.** Which of the following is a free radical substitution reaction ?

(1) Benzene with $Br_2/AlCl_3$

(2) Acetylene with HBr

(3) Methane with $Br_2/hv$

(4) Propene with $HBr/(C_6H_5COO)_2$

## NEET(UG) 2021

**43.** The major product formed in dehydrohalogenation reaction of 2-Bromo pentane is Pent-2-ene. This product formation is based on ?

(1) Saytzeff's Rule

(2) Hund's Rule

(3) Hoffmann Rule

(4) Huckel's Rule

**44.** $CH_3CH_2COO^-Na^+ \xrightarrow[Heat]{NaOH,\,+?} CH_3CH_3 + Na_2CO_3.$

Consider the above reaction and identify the missing reagent/chemical.

(1) $B_2H_6$

(2) Red Phosphorus

(3) CaO

(4) DIBAL-H

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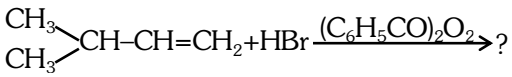
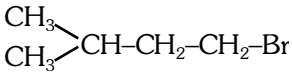
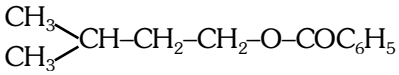
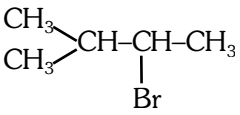
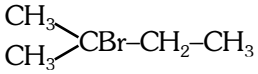
**45.** The major product of the following chemical reaction is:



(1) 

(2) 

(3) 

(4) 

## EXERCISE-II (Previous Year Questions) ANSWER KEY

| Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Answer | **4** | **4** | **3** | **3** | **1** | **2** | **2** | **4** | **3** | **2** | **4** | **2** | **3** | **1** | **4** |
| Question | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| Answer | **3** | **4** | **4** | **4** | **4** | **3** | **1** | **2** | **1** | **1** | **3** | **2** | **2** | **3** | **4** |
| Question | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 |
| Answer | **3** | **2** | **3** | **2** | **2** | **1** | **4** | **4** | **4** | **1** | **4** | **3** | **1** | **3** | **1** |

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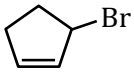
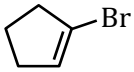
## Exercise – III (Analytical Questions) Master Your Understanding

**1.** $\xrightarrow{Br_2}$ A $\xrightarrow{\text{alc. KOH}}$ B ;

What is the structure of B

(1) 

(2)

(3) 

(4)

**2.** Which of the following is maximum reactive for NBS

(1) $PhCH_3$ (2) $Ph\ CH_2—CH_3$

(3) $PhCH_2—CH—CH_2$ (4) $Ph–\underset{\displaystyle CH_3}{\underset{|}{CH}}–CH=CH_2$

**3.** Which of the following reactions show that there are three C=C bond in benzene

(a) $C_6H_6 + Br_2 \xrightarrow{FeBr_3}$

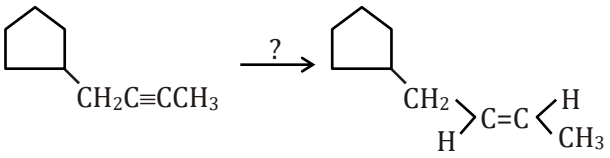
(b) $C_6H_6 + HNO_3 \xrightarrow{H_2SO_4}$

(c) $C_6H_6 + 3O_3 \longrightarrow$

(d) $C_6H_6 + 3H_2 \xrightarrow{Ni}$

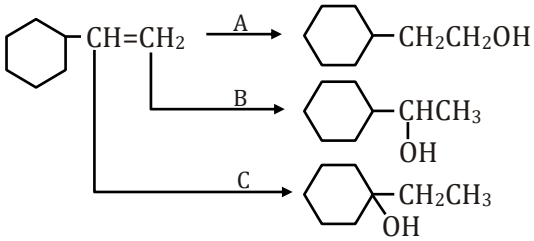
(1) a, c (2) b, d (3) b, c, d (4) c, d

**4.** Reagent used to carry out following alkyne to alkene is




(1) Pd-C/$H_2$ (2) Na/$NH_3$

(3) Pd/$H_2$ (4) Ni/$H_2$

**5.** 


Schemes; A, B and C are :-

(1) Simple hydration

(2) Hydroboration, mercuration-demercuration, hydration

(3) Hydration, hydroboration, mercuration-demercuration

(4) Mercuration-demercuration, hydration, hydroboration

**6.** $CH_3-\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}-CH=CH-CH_3 \xrightarrow{H-Cl} ?$

(1) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}-CH_2-\underset{\displaystyle Cl}{\underset{|}{CH}}-CH_3$

(2) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle Cl}{\overset{|}{C}}}}-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3$

(3) $CH_3-\underset{\displaystyle CH_3\ \ Cl}{\underset{|\ \ |}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}-CH-CH_2-CH_3$

(4) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle Cl}{\overset{|}{C}}}}-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3$

**7.** Correct reactivity order for EAR of following compounds is

$Ph–CH=CH_2$ (I) $\qquad Ph–\overset{\displaystyle CH_3}{\overset{|}{C}}=CH–CH_3$ (II)

$Ph_2C=CH–CH_3$ (III) $\qquad CH_2=CH–NO_2$ (IV)

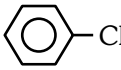
(1) IV > I > II > III (2) III > II > I > IV

(3) II > III > I > IV (4) II > III > IV > I

**8.** The intermediate during the addition of HCl to propene in the presence of peroxide is

(1) $CH_3\dot{C}H\,CH_2Cl$ (2) $CH_3\overset{\oplus}{C}H–CH_3$

(3) $CH_3–CH_2–\overset{\oplus}{C}H_2$ (4) $CH_3\dot{C}HCH_3$

**9.**  $CH=CH–COOH + Br_2 \longrightarrow A$

the number of chiral carbons in 'A' are

(1) 1 (2) 2 (3) 3 (4) 4

**10.** $CH_3–CH=CH_2 \xrightarrow{dil/H_2SO_4} A$

$CH_3–CH=CH_2 \xrightarrow{B_2H_6} \xrightarrow[^-OH]{H_2O_2} B$

Wrong statement about the product is

(1) A and B have the same functional group

(2) A and B are position isomers.

(3) A and B show chain isomerism

(4) Mixed ether is the isomer of both A and B

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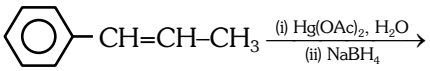
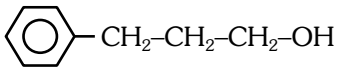
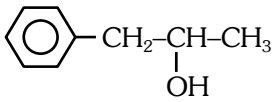
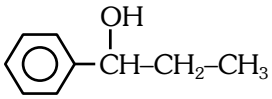
**11.** Which of the following alkene is most reactive for hydration
(1) Ethene (2) Propene
(3) 1–butane (4) 2–methyl propene

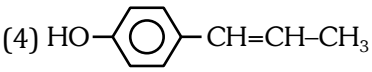
**12.** The major product of the following reaction is

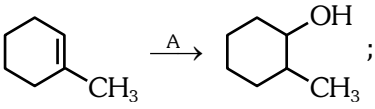


(1) 

(2) 

(3) 

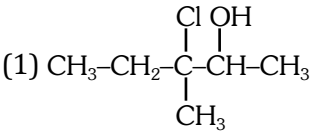
(4) 

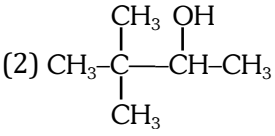
**13.**  ; Reagent 'A' is

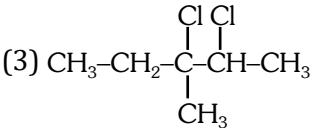
(1) $BH_3, H_2O_2/\overset{\ominus}{O}H$
(2) $H_2O/H^{\oplus}$
(3) $Hg(OCOCH_3)_2, H_2O/NaBH_4$
(4) $Cl_2$/aq. NaOH

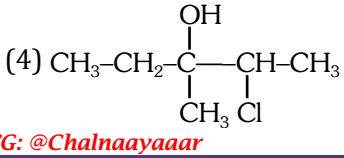
**14.** Which of the following alkenes on hydration gives a tertiary alcohol
(1) 2–Butene (2) Isobutylene
(3) Ethene (4) α–Butylene

**15.** The predominant product formed when 3–methyl–2–pentene reacts with HOCl is

(1) 

(2) 

(3) 

(4) 

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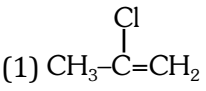
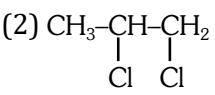
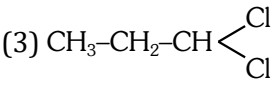
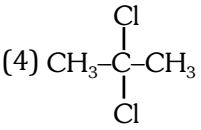
**16.** Propene on addition with HI, gives
(1) $CH_3—CHI—CH_3$ (2) $CH_3—CH_2—CH_2I$
(3) $CH_3—CHI—CH_2I$ (4) None of the above

**17.** What is the main product of this reaction?
$CH_3 - C \equiv CH \xrightarrow[\text{Excess}]{HCl(g)}$ ?

(1) 

(2) 

(3) 

(4) 

**18.** 3–Phenyl propene on reaction with HBr gives (as a major product)
(1) $C_6H_5CH_2CH(Br)CH_3$
(2) $C_6H_5CH(Br)CH_2CH_3$
(3) $C_6H_5CH_2CH_2CH_2Br$
(4) $C_6H_5CH(Br)CH=CH_2$

**19.** Reaction of HBr with propene in the presence of peroxide gives
(1) 3–bromo propane (2) Allyl bromide
(3) n–propyl bromide (4) Isopropyl bromide

**20.** Isobutylene $\xrightarrow[H_2O_2]{HBr}$ "product". The product is
(1) Isobutyl bromide
(2) Tert. butyl bromide
(3) Tert. butyl alcohol
(4) isobutyl alcohol

**21.** The nitrating agent for the nitration of alkanes is:
(1) Conc. $HNO_3$
(2) Mixture of conc. $HNO_3$ and conc. $H_2SO_4$
(3) Acetyl nitrate
(4) $HNO_3$ vapours at high temperature

**22.** The chain propagating step is fastest in the reaction of an alkane with
(1) Fluorine free radical
(2) Chlorine free radical
(3) Iodine free radical
(4) Bromine free radical

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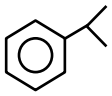
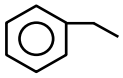
**23.** In the nitration of propane, the product obtained in maximum yield is
(1) 1–nitropropane (2) 2-nitropropane
(3) Nitroethane (4) Nitromethane

**24.** Only two isomeric monochloro derivatives are possible for (exclude stereo isomers)
(1) n-butane
(2) 2, 4-dimethyl pentane
(3) Benzene
(4) 2-methyl butane

**25.** What is the chief product obtained when n-butane is treated with bromine in the presence of light at 130°C ?
(1) $CH_3–CH_2–CH_2–CH_2–Br$
(2) $CH_3–CH_2–\underset{\displaystyle CH_3}{\underset{|}{CH}}–Br$
(3) $CH_3–\underset{\displaystyle CH_3}{\underset{|}{CH}}–CH_2–Br$
(4) $CH_3–\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}–CH_2–Br$

**26.** The strongest deactivating effect on aromatic ring is
(1) $–CH_2Cl$ (2) $–OCH_3$
(3) $–CH_3$ (4) $–CCl_3$

**27.** Which of the following is maximum reactive towards E.S.R. :-
(1) (2)
(3)  (4) 

**28.** Correct order of reactivity of following compound with an electrophile :-
(I) $p–CH_3–C_6H_4–CH_3$ (II) $C_6H_5–CH_3$
(III) $p–CH_3–C_6H_4–NO_2$ (IV) $p–O_2N–C_6H_4–NO_2$
(1) I > II > III > IV (2) II > I > IV > III
(3) III > II > I > IV (4) IV > III > II > I

**29.** Toluene is more reactive than benzene towards electrophilic reagents due to :-
(1) Inductive effect only
(2) Hyperconjugative effect only
(3) Both inductive as well as hyperconjugative effects
(4) Strong mesomeric effect

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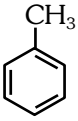
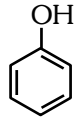
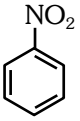
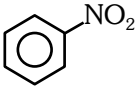
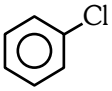
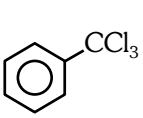
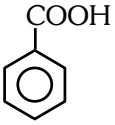
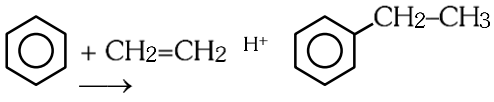
**30.** Nitration of benzene is
(1) Nucleophilic substitution
(2) Nucleophilic addition
(3) Electrophilic substitution
(4) Electrophillic addition

**31.** Consider the following compounds :
(I) (II) 
(III)  (IV) 
Correct order of their reactivity in electrophilic substitution reactions would be:-
(1) I > II > III > IV (2) IV > III > II > I
(3) III > II > I > IV (4) III > IV > I > II

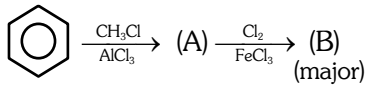
**32.** The active species in the nitration of benzene is
(1) $\overset{+}{N}O_2$ (2) $HNO_3$ (3) $N\bar{O}_3$ (4) $N\bar{O}_2$

**33.** The function of anhydrous $AlCl_3$ in the Friedel craft's reaction
(1) To absorb water
(2) To absorb HCl
(3) To produce electrophile
(4) To produce Nucleophile

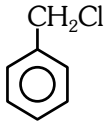
**34.** In which of the following compound the electrophile attack on o– and p– positions :
(1)  (2) 
(3)  (4) 

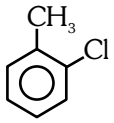
**35.** 
Incorrect statement about this reaction
(1) Benzene is substrate
(2) Ethene is reagent
(3) Reaction is EAR with respect to ethene
(4) Reaction is NSR for benzene

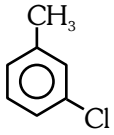
**36.** For the reaction

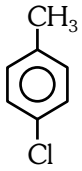


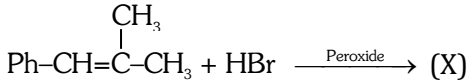
Product B is :

(1) 

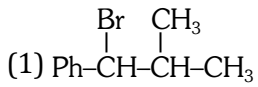
(2) 

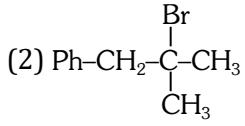
(3) 

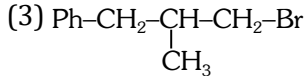
(4) 

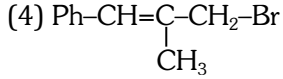
**37.** 

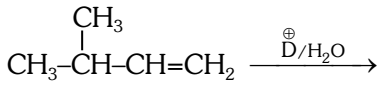
'X' is

(1) 

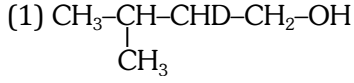
(2) 

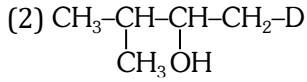
(3) 

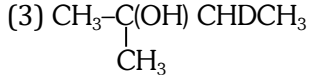
(4) 

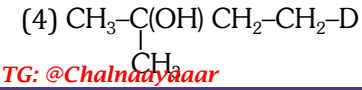
**38.** 

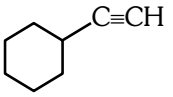
A (major product) is

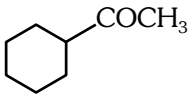
(1) 

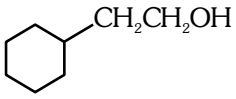
(2) 

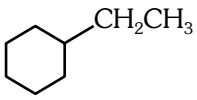
(3) 

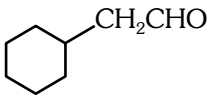
(4) 

**39.** Hydration of  in presence of $H_2SO_4/HgSO_4$ gives

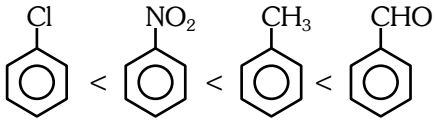
(1) 

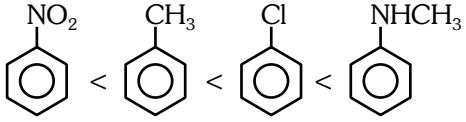
(2) 

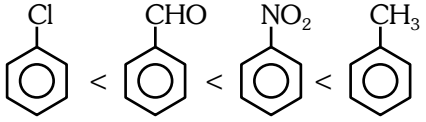
(3) 

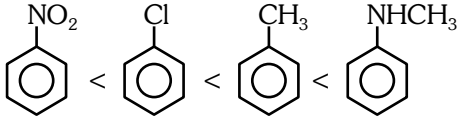
(4) 

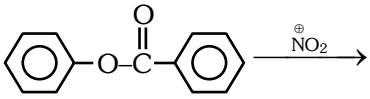
**40.** Identify correct order of reactivity for electrophilic substitution reaction of the following compounds :–

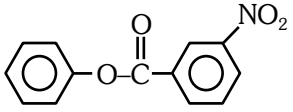
(1) 

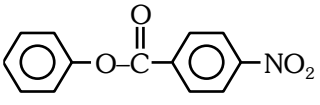
(2) 

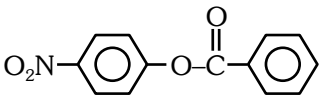
(3) 

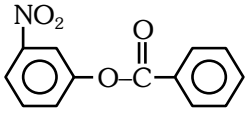
(4) 

**41.**  Product is :-

(1) 

(2) 

(3) 

(4) 

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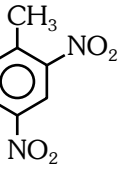
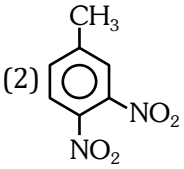
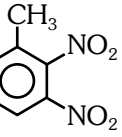
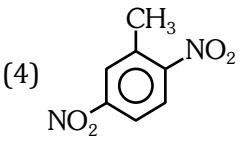
**42.** p- nitro toluene on further nitration gives

(1) 

(2) 

(3) 

(4) 

**43.** Which of the following reaction gives t-butyl benzene:

(1) $C_6H_6$ + t–butyl chloride, $\xrightarrow{AlCl_3}$

(2) $C_6H_6 + (CH_3)_2C{=}CH_2 \xrightarrow{HF}$

(3) $C_6H_6$ + t–butyl alcohol $\xrightarrow{H_2SO_4}$

(4) All of them

**44.** Halogenation of alkanes gives a mixture of monohalo products. The ease of substitution follows the order

(1) Tertiary H > primary H > secondary H

(2) Primary H < secondary H < tertiary H

(3) Primary H > secondary H > tertiary H

(4) Secondary H > tertiary H < primary H

**45.** The number of different substitution products possible when ethane is allowed to react with bromine in sunlight are

(1) 9 (2) 6 (3) 8 (4) 5

**46.** Chlorination of toluene in the presence of light and heat followed by treatment with aqueous NaOH gives

(1) o-cresol

(2) p-cresol

(3) 2, 4-dihydroxy toluene

(4) Benzyl alcohol

**47.** Which gives maximum yield of $C_2H_5Cl$

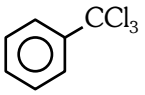
(1) $C_2H_6 + Cl_2 \xrightarrow[\text{excess}]{hv,\ light} C_2H_5Cl + HCl$

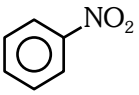
(2) $C_2H_6 + Cl_2 \xrightarrow[\text{excess}]{hv\ light} C_2H_5Cl + HCl$

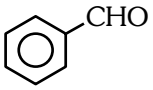
(3) $C_2H_6 + Cl_2 \xrightarrow{hv\ light} C_2H_5Cl$

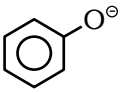
(4) $C_2H_6 + Cl_2 \xrightarrow{Dark} C_2H_5Cl + HCl^-$

**48.** Electrophile $\overset{\oplus}{N}O_2$ attacks the following :

(I) 

(II) 

(III) 

(IV) 

in which cases $\overset{\oplus}{N}O_2$ will attack at meta position

(1) II and IV (2) I, II and III

(3) III and IV (4) I only

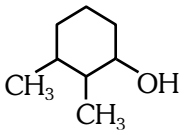
**49.** The major product obtained on treatment of $CH_3CH_2CH(F)CH_3$ with $CH_3O^-/CH_3OH$ is

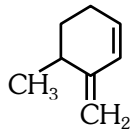
(1) $CH_3CH_2CH(OCH_3)CH_3$

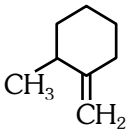
(2) $CH_3CH{=}CHCH_3$

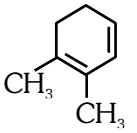
(3) $CH_3CH_2CH{=}CH_2$

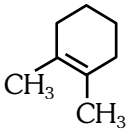
(4) $CH_3CH_2CH_2CH_2OCH_3$

**50.**  $\xrightarrow[\Delta]{H^+}$ X (major) 'A' is

(1) 

(2) 

(3) 

(4) 

**51.** Which is not correct about nitration ?

(1) $\overset{\oplus}{N}O_2$ is an attacking electrophile

(2) In general, nitration is monosubstitution process

(3) In nitrating mix, $HNO_3$ acts as acid, & $H_2SO_4$ acts as base

(4) In nitrating mix, $HNO_3$ acts as base, & $H_2SO_4$ acts as an acid

**52.** Match the column :-

| | Column-I (Reactants) | | Column-II (Product) |
|---|---|---|---|
| (a) | $CaC_2 + H_2O$ | (p) | $CaC_2$ |
| (b) | CaO + C | (q) | $H_2$ |
| (c) | $HC \equiv CH + Na$ | (r) | $CH_4$ |
| (d) | $CH_3COOH$ + NaOH + CaO | (s) | $C_2H_2$ |

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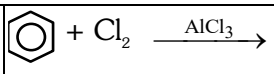
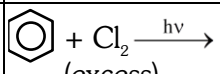
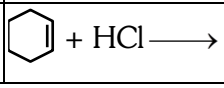
(1) a – q, b – p, c – r, d – s
(2) a – p, b – q, c – s, d – r
(3) a – s, b – p, c – q, d – r
(4) a – p, b – q, c – r, d – s

**53.** Match the column :-

| Column-I (Reaction) | | Column-II (Product) | |
|---|---|---|---|
| (a) | $HC \equiv CH + H_2O \rightarrow$ | (p) | Benzene |
| (b) | $HC \equiv CH + H_2O \xrightarrow{Hg^{+2}/H^{\oplus}}$ | (q) | Ammonia |
| (c) | $HC \equiv CH + NaNH_2 \rightarrow$ | (r) | No reaction |
| (d) | $HC \equiv CH \xrightarrow[\text{Fe tube}]{\text{Red hot}}$ | (s) | Acetaldehyde |

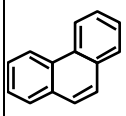
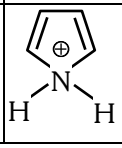
(1) a – q, b – p, c – r, d – s
(2) a – r, b – s, c – q, d – p
(3) a – q, b – p, c – s, d – r
(4) a – p, b – q, c – r, d – s

**54.** Match the column :-

| Column-I (Reaction) | | Column-II (Type of reaction) | |
|---|---|---|---|
| (a) |  | (p) | Free radical addition |
| (b) |  (excess) | (q) | Free radical substitution |
| (c) | $CH_4 + Br_2 \xrightarrow{h\nu}$ | (r) | Electrophilic addition |
| (d) |  | (s) | Electrophilic substitution |

(1) a – p, b – q, c – s, d – r
(2) a – q, b – p, c – s, d – r
(3) a – p, b – q, c – r, d – s
(4) a – s, b – p, c – q, d – r

**55.** Match the column :-

| Column-I | | Column-II | |
|---|---|---|---|
| (a) | Aromatic | (p) | |
| (b) | Anti aromatic | (q) | |
| (c) | Non-aromatic | (r) |  |
| | | (s) |  |

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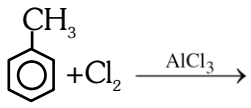
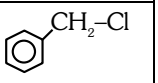
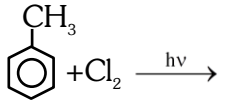
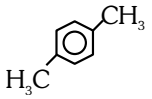
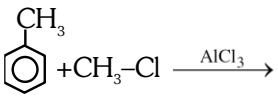
(1) a – q, b – p, c – r,s
(2) a – p, b – q, c – r,s
(3) a – r, b – q, c – p,s
(4) a – p,s, b – q, c – r

**56.** Match the column :-

| Column-I (Reaction) | | Column-II (Product) | |
|---|---|---|---|
| (a) |  | (p) |  |
| (b) |  | (q) |  |
| (c) |  | (r) | |

(1) a – q, b – p, c – r
(2) a – r, b – p, c – q
(3) a – q, b – r, c – p
(4) a – p, b – q, c – r

**57.** Match the column-I with column-II :-

| Column-I | | Column-II | |
|---|---|---|---|
| (a) | Lindlar's catalyst | (p) | $Na/liq.\ NH_3$ |
| (b) | Birch catalyst | (q) | $H_2/Pd\text{-}CaCO_3$ |
| (c) | Baeyer's Reagent | (r) | $HBr/(PhCO)_2O_2$ |
| (d) | Kharasch effect | (s) | Dil. $KMnO_4/273K$ |

(1) a – q, b – p, c – r, d – s
(2) a – p, b – q, c – s, d – r
(3) a – q, b – p, c – s, d – r
(4) a – p, b – q, c – r, d – s

**58.** Match the column-I with column-II :-

| Column-I (Reaction) | | Column-II (Product) | |
|---|---|---|---|
| (a) | $2CH_3CH_2Br \xrightarrow[\text{dry ether}]{2Na}$ | (p) | |
| (b) | $CH_3COO^{\ominus}Na^{\oplus} \xrightarrow[\Delta]{CaO+NaOH}$ | (q) | $CH_3CH_2CH_2CH_3$ |

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| | | | |
|---|---|---|---|
| (c) | $CH_3(CH_2)_4CH_3 \xrightarrow[773K,\ 10-20\,atm]{V_2O_5}$ | (r) | $2CH_3OH$ |
| (d) | $2CH_4 + O_2 \xrightarrow[100\,atm]{Cu/523K}$ | (s) | $CH_4$ |

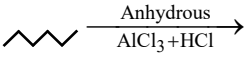
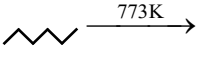
(1) a – q, b – p, c – r, d – s
(2) a – q, b – s, c – p, d – r
(3) a – q, b – p, c – s, d – r
(4) a – p, b – q, c – r, d – s

**59.** Match the column-I with column-II :-

| Column-I (Reaction) | | Column-II (Product) | |
|---|---|---|---|
| (a) | $CH_4 + O_2 \xrightarrow[\Delta]{Mo_2O_3}$ | (p) | $(CH_3)_3C - OH$ |
| (b) | $2CH_3CH_3 + 3O_2 \xrightarrow[\Delta]{(CH_3COO)_2Mn}$ | (q) | $HCHO + H_2O$ |
| (c) | $(CH_3)_3CH \xrightarrow[Oxidation]{KMnO_4}$ | (r) | $CO + 3H_2$ |
| (d) | $CH_4 + H_2O \xrightarrow[\Delta]{Ni}$ | (s) | $2CH_3COOH + 2H_2O$ |

(1) a – q, b – p, c – r, d – s
(2) a – r, b – s, c – p, d – r
(3) a – q, b – s, c – p, d – r
(4) a – p, b – q, c – r, d – s

**60.** Match the column-I with column-II :-

| Column-I (Reaction) | | Column-II (Type of reaction) | |
|---|---|---|---|
| (a) | $HC \equiv CH \xrightarrow[Pd]{H_2}$ | (p) | Pyrolysis |
| (b) |  | (q) | Reduction |
| (c) |  | (r) | Free radical substitution |
| (d) | $CH_3CH_3 \xrightarrow[h\nu]{Cl_2}$ | (s) | Isomerisation |

(1) a – q, b – s, c – p, d – r
(2) a – p, b – q, c – s, d – r
(3) a – q, b – p, c – s, d – r
(4) a – p, b – q, c – r, d – s

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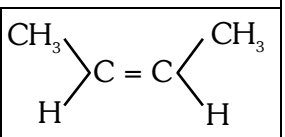
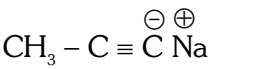
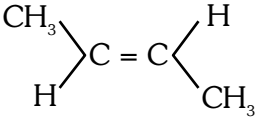
**61.** Match the column-I with column-II :-

| Column-I (Reaction) | | Column-II (Product) | |
|---|---|---|---|
| (a) | $CH_3-C\equiv C-CH_3 \xrightarrow[Pd/C]{H_2}$ | (p) |  |
| (b) | $CH_3-C\equiv C-CH_3 \xrightarrow{Na/liq.NH_3}$ | (q) |  |
| (c) | $CH_3-C\equiv C-CH_3 \xrightarrow[Quinoline]{H_2/Pd-C}$ | (r) | $CH_3CH_2CH_2CH_3$ |
| (d) | $CH_3-C\equiv CH \xrightarrow{Na/liq.NH_3}$ | (s) |  |

(1) a – s, b – r, c – q, d – p
(2) a – p, b – s, c – r, d – q
(3) a – r, b – s, c – p, d – q
(4) a – p, b – q, c – r, d – s

**62.** Match the column-I with column-II :-

| Column-I (Compound) | | Column-II (Boiling point) | |
|---|---|---|---|
| (a) | 2-Methyl propane | (p) | 309.1 K |
| (b) | Pentane | (q) | 282.5 K |
| (c) | 2-Methyl butane | (r) | 261 K |
| (d) | 2,2-Dimethylpropane | (s) | 300.9 K |

(1) a – r, b – p, c – s, d – q
(2) a – q, b – r, c – s, d – p
(3) a – r, b – s, c – q, d – p
(4) a – s, b – r, c – q, d – p

**63.** Match the column-I with column-II :-

| Column-I | | Column-II | |
|---|---|---|---|
| (a) | 2,8-Dimethyl-3,6-decadiene | (p) | $41\sigma$ & $1\pi$ |
| (b) | 1,3,5,7-octatetraene | (q) | $23\sigma$ & $1\pi$ |
| (c) | 2-n-propylpent-1-ene | (r) | $17\sigma$ & $4\pi$ |
| (d) | 4-ethyl-2,6-dimethyldec-4-ene | (s) | $33\sigma$ & $2\pi$ |

(1) a – s, b – p, c – r, d – q
(2) a – s, b – r, c – q, d – p
(3) a – r, b – p, c – s, d – q
(4) a – q, b – s, c – r, d – p

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**64.** Match the column-I with column-II :-

| Column-I | | Column-II | |
|---|---|---|---|
| (a) | $CH_3 - CH = CH_2 \xrightarrow[H_2O]{H^\oplus} CH_3 - \underset{\underset{OH}{|}}{CH} - CH_3$ | (p) | Hydro-genation |
| (b) | $CH_3 - CH = CH_2 \xrightarrow[R_2O_2]{HBr} CH_3 - CH_2 - CH_2 - Br$ | (q) | Hydration |
| (c) | $CH_3 - CH = CH_2 \xrightarrow[CCl_4]{Br_2} CH_3 - \underset{\underset{Br}{|}}{CH} - CH_2 - Br$ | (r) | Halogenation |
| (d) | $CH_2 = CH_2 \xrightarrow[Pd]{H_2} CH_3 - CH_3$ | (s) | Hydro-halogenation |

(1) a – s, b – r, c – q, d – p
(2) a – q, b – s, c – r, d – p
(3) a – r, b – s, c – p, d – q
(4) a – p, b – q, c – r, d – s

**65.** Given below are two statements:
**Statement-I :** Alkenes decolourise $KMnO_4$ solution.
**Statement-II :** Alkenes undergo addition reactions, which are mainly nucleophilic addition reactions.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Statement-I and Statement-II are correct.
(2) Both Statement-I and II are incorrect.
(3) Statement-I is correct but Statement-II is incorrect.
(4) Statement-I is incorrect but Statement-II is correct.

**66.** Given below are two statements:
**Statement-I :** Ozonolysis of alkenes involves the addition of ozone molecule to alkene to form ozonide and then cleavage of the ozonide by Zn-$H_2O$ to smaller molecules.
**Statement-II :** Ozonolysis reaction is highly useful in detecting the position of double bond in alkenes or in other unsaturated compounds.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Both Statement-I and Statement-II both are correct.
(2) Statement-I and II both are incorrect.
(3) Statement-I is wrong but Statement-II is correct.
(4) Statement-I is correct but Statement-II is wrong.

**67.** Given below are two statements:
**Statement-I :** Peroxide effect is not observed in addition of HCl & HI
**Statement-II :** HCl bond is stronger than HBr bond and H – I bond is weaker than H – Br bond.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Both Statement-I and Statement-II are correct.
(2) Statement-I is correct but Statement-II is incorrect.
(3) Statement-I is incorrect but Statement-II is correct.
(4) Statement-I and II both are incorrect.

**68.** Given below are two statements:
**Statement-I :** Cis-But-2-ene has less dipole moment than trans-but-2-ene.
**Statement-II :** R–C ≡ C–R' reacts with $H_2$ in presence of Na/liq. $NH_3$ to form cis-alkene.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Statement-I is correct but Statement-II is incorrect.
(2) Statement-I is incorrect but Statement-II is correct.
(3) Statement-I and Statement-II are correct.
(4) Both Statement-I and II are incorrect.

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**69.** Given below are two statements:

**Statement-I :** Dihydrogen gas adds to alkenes and alkynes in the presence of finely divided catalyst like platinum, palladium or Nickel to form alkanes.

**Statement-II :** Metals adsorb dihydrogen gas on their surfaces and activate the hydrogen-hydrogen bond.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both statements-I and II are correct.

(2) Both Statement-I and II are incorrect

(3) Statement-I is correct but Statement-II is incorrect.

(4) Statement-I is incorrect but Statement-II is correct.

**70.** Given below are two statements:

**Statement-I :** Sodium metal reacts with Ethyne and form sodium acetylide with liberation of nascent oxygen gas.

**Statement-II :** Alkynes are more acidic than alcohols.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statements-I and II both are incorrect.

(2) Statement-I is correct but Statement-II is incorrect.

(3) Statement-I is incorrect but Statement-II is correct.

(4) Statement-I and II both are correct

**71.** Given below are two statements:

**Statement-I :** Ethyne is formed from dibromoethane by using alcoholic KOH followed by $NaNH_2$.

**Statement-II :** Ethyne is formed from geminal dibromo ethane by using one equivalent of alcoholic KOH.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statement-I and Statement-II both are correct.

(2) Statement-I and II both are incorrect.

(3) Statement-I is correct but Statement-II is incorrect.

(4) Statement-I is incorrect but Statement-II is correct.

**72.** Given below are two statements:

**Statement-I :** Hydrogenation of alkenes and alkynes with platinum and palladium catalyse the reaction at room temperature but nickel catalyst requires high temperature and pressure.

**Statement-II :** Alkyl halides on reduction with zinc and dilute HCl give alkene.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statement-I and II both are incorrect.

(2) Statement-I and Statement-II both are correct.

(3) Statement-I is correct but Statement-II is incorrect.

(4) Statement-I is incorrect but Statement-II is correct.

**73.** Given below are two statements:

**Statement-I :** Alkyl halides on treatment with sodium metal in moist ether gives higher alkane.

**Statement-II :** Wurtz reaction is used for the preparation of higher alkanes containing even number of carbon atoms.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statement-I and Statement-II both are correct.

(2) Statement-I and II both are incorrect.

(3) Statement-I is correct but Statement-II is incorrect.

(4) Statement-I is incorrect but Statement-II is correct.

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**74.** Given below are two statements:

**Statement-I :** is aromatic compound

**Statement-II :** There are 12 $\pi e^-$ having complete delocalisation.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statement-I is incorrect but Statement-II is correct.

(2) Statement-I is correct but Statement-II is incorrect.

(3) Statement-I and Statement-II are correct.

(4) Both Statement-I and II are incorrect.

**75.** Given below are two statements:

**Statement-I :** Naphthalene balls are used in toilets and for preservation of clothes.

**Statement-II :** Naphthalene balls are immiscible with water but are readily miscible with organic solvents.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statement-I is correct but Statement-II is incorrect.

(2) Statement-I is incorrect but Statement-II is correct.

(3) Statement-I and Statement-II are correct.

(4) Statement-I and Statement-II are incorrect.

**76.** Given below are two statements:

**Statement-I :** $P–H_3C–C_6H_5–NO_2$ is more reactive than $P–O_2N–C_6H_5–NO_2$ towards electrophile.

**Statement-II :** $–CH_3$ is ortho/para directing group while $–NO_2$ is meta directing group.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both Statement-I and Statement-II are correct.

(2) Statement-I and Statement-II are incorrect.

(3) Statement-I is incorrect but Statement-II is correct.

(4) Statement-I is correct but Statement-II is incorrect.

**77.** Given below are two statements:

**Statement-I :** Ozonolysis of o-xylene (1,2-dimethyl benzene gives three products. The result supports kekule structure of benzene.

**Statement-II :** Benzene have $6\pi e^-$ in cycle and have cyclic delocalisation.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statement-I is correct but Statement-II is incorrect.

(2) Statement-I is incorrect but Statement-II is correct.

(3) Statement-I and Statement-II are incorrect.

(4) Both Statement-I and Statement-II are correct.

**78.** In given statements which is/are correct :-

(A) Cis & Trans isomers have same structure but have different configuration (arrangement of atoms or groups)

(B) Cis-2-butene has more boiling point than trans-2-butene.

(C) Trans-2-butene has more dipole moment than cis-2-butene.

(D) Geometrical isomerism is also shown by alkenes of the types XY C = C XZ and XY C = C ZW.

(1) A, B, C & D (2) Only A, B

(3) Only A, B & C (4) Only A, B & D

**79.** Which of the following statements is/are incorrect :-

(A) In alkenes first three members are gases, the next 14 are liquid & the higher ones are solids.

(B) Except ethene all other alkenes are colourless & odourless.

(C) Straight chain alkenes have higher boiling point than isomeric branched chain compounds.

(D) Generally alkenes are soluble in water & insoluble in non polar solvents.

(1) A, B & C only (2) Only D

(3) B & D only (4) B, C & D only

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**80.** Given below are two statements; one is labelled as **Assertion (A)** and the other is labelled as **Reason(R)** .

**Assertion:** If benzene is treated with 1-chloropropane in presence of anhydrous $AlCl_3$, Isopropyl benzene is major product not n-propyl benzene.

**Reason :** Reaction occurs via rearrangement of carbocation.

In the light of the above statements, choose the **most appropriate** answer from the options given below :

(1) Both (A) and (R) are correct but (R) is not the correct explanation of (A).

(2) Both (A) and (R) are correct and (R) is the correct explanation of (A).

(3) (A) is correct but (R) is not correct.

(4) (A) is not correct but (R) is correct.

## EXERCISE-III (Analytical Questions) ANSWER KEY

| Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Answer | **4** | **4** | **4** | **2** | **2** | **1** | **2** | **2** | **2** | **3** | **4** | **3** | **1** | **2** | **4** |
| Question | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| Answer | **1** | **4** | **2** | **3** | **1** | **4** | **1** | **2** | **1** | **2** | **4** | **2** | **1** | **3** | **3** |
| Question | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 |
| Answer | **3** | **1** | **3** | **2** | **4** | **2** | **2** | **4** | **1** | **4** | **3** | **1** | **4** | **2** | **1** |
| Question | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| Answer | **4** | **2** | **2** | **3** | **4** | **3** | **3** | **2** | **4** | **3** | **2** | **3** | **2** | **3** | **1** |
| Question | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 |
| Answer | **3** | **1** | **2** | **2** | **3** | **1** | **1** | **4** | **1** | **1** | **3** | **3** | **4** | **2** | **3** |
| Question | 76 | 77 | 78 | 79 | 80 | | | | | | | | | | |
| Answer | **1** | **4** | **4** | **2** | **2** | | | | | | | | | | |

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# Important Notes